LEAD TECHNICAL ABSTRACTS

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LEAD DEVELOPMENT ASSOCIATION

LEAD TECHNICAL ABSTRACTS 9

A selection of Abstracts of Literature and Patents
on the Utilisation of Lead and its Alloys

Contents

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PART 1 · TECHNICAL PAPERS

In the event of books, documents, articles and patents, quoted in Lead Technical Abstracts, being unobtainable from or through local libraries, technical booksellers (many of whom provide an international service) or appropriate government departments, applicants should notify their difficulties to the Association, which will do its best to assist.

ANALYSIS

470 Controlled Potential Electrolytic Determination of Copper in Lead and Tin-Base Alloys — **B. Alfonsi**

Analyt. Chim. Acta, May, 1960, 22(5), 431–436

In lead-base alloys containing less than 1.5% antimony, a single controlled electrolysis is sufficient to determine copper. When more antimony is present double electrolysis is necessary.

471 Estimating the Purity of Metal Anodes: (6) Lead — **M. Straschill**

Product Finishing, Nov., 1959, 12(11), 86–87

Detailed analytical instructions for approximate determination of silver and bismuth in lead anodes.

ATOMICS

472 Foundry Radiation Protection Manual — **American Foundrymen's Society**

Book, 1960, 60pp. AFS, Des Plaines, Ill. $9

Increased use of radio isotopes in industry has stimulated the production of this Manual. There are chapters covering all aspects of radiation in industry, including methods of shielding.

COATINGS

473 Pickling Non-Ferrous Metals — **K. A. van Oeteren**

Metalloberfläche, Jan., March, 1960, 14(1, 3), 21–23, 86–87

(In German.) Lead is amongst the metals for which compositions of pickling baths and pickling temperatures are given.

CORROSION

474 New Look at Sulphuric-Resisting Alloys — **C. M. Schillmoller and F. L. LaQue**

Chem. Eng., April 4, 1960, 67(7), 170, 172, 174

This is an abridged version of a paper presented to A.I.M.E., February, 1960. A chart shows the corrosion resistance of lead and other metals to H_2SO_4 at various concentrations and temperatures. The beneficial effect of metal sulphate inhibitors is considered.

475 Materials of Construction for Equipment Used with Hydrogen Peroxide — **R. Bloom, Jnr., L. E. Weeks and C. W. Raleigh**

Corrosion, April, 1960, 16(4), 164t–170t

Resistance of lead and other metals to 90wt% H_2O_2.

476 Penetration of Lead by the Wood Piddock (Martesia striata) — **G. V. Springer and E. R. Beeman**

Science, May 6, 1960, 131, 1378–1379

A description of the effect on the lead sheathing of a submarine power cable of attack by shell-fish. This is the third attack of this type recorded, all of which have occurred near Florida.

477 Corrosion of Steels in Liquid Bismuth and Lead — **J. A. James and J. Trotman**

J. Iron Steel Inst., March, 1960, 194(3), 310–323

Attack by lead is much less than that by bismuth and can be inhibited by a titanium content in the lead of 500ppm.

GENERAL

478 Symposium on Lead, April 1960 — **Gesellschaft Deutscher Metallhüttenund Bergleute**

Erzmetall, May, 1960, 13(5), 248–250

(In German.) Abstracts of papers on smelting, cable sheaths, and the systems Pb-Sn-O and Pb-Sn-Sb-Cu.

LEADED STEEL

479 Machining Characteristics of Leaded Steel — **F. L. Bagley Jr. and R. Mennell**

Trans. of the ASME (Journal of Basic Engineering), Vol. 82, No. 2, p. 347, June, 1960

The mechanism of lead in promoting machineability is discussed.

MECHANICAL PROPERTIES

480 Creep of Indium, Lead, and some of their Alloys with Various Metals — **J. Weertman**

Trans. AIME Met. Soc., April, 1960, 218(2), 207–218

Equations previously derived from a dislocation creep model due to Mott give rise to certain predictions which are now checked by high temperature creep tests. The power law creep equation breaks down at a much smaller stress for lead and indium than for metals with larger elastic moduli.

481 Mechanical Properties of a High-Purity Lead and a 0.058 per cent Copper–Lead Alloy at Elevated Temperatures — **T. E. Tietz**

A.S.T.M. Proc., 1959, 59, 1052–1071

Determination of various properties between 38 and 163°C indicates important effect of rate of straining and grain size.

482 **Investigation of Creep of Metals and Alloys** — **I. Y. Geguzin and V. I. Kudrik**

The Physics of Metals and Metallography, Vol. 7, No. 2, p. 71, 1959

METALLOGRAPHY

483 **Studies on the Microhardness of Metals. The Dependence of the Indentation Hardness on the Load** — **A. M. Shams El Din and N. Ibl**

Schweizer Archiv, June, 1960, 26(6), 246–250

(In English.) Tests on a lead-5% antimony alloy were included.

METALLURGY

484 **The Solubility of Tin in Solid Lead** — **J. W. Cahn and H. N. Treaftis**

Trans. AIME Met. Soc., April, 160, 218(2), 376–377

This is an attempt to locate more accurately the limits of the solubility of tin in solid lead. Tin solubility at 25°C is given as 2±0.2 at%.

485 **The Diffusion of Certain Metals in Molten Lead** — **E. Pelzel**

Z. Metallkunde, Nov., 1959, 50(11), 649–651

(In German.) Colour changes of the surface oxide film are used to study diffusion of various metals in lead.

486 **The Gallium-Lead and Gallium-Thallium Equilibrium Diagrams** — **B. Predel**

Z. Metallkunde, Nov., 1959, 50(11), 663–667

(In German.) The two diagrams are similar, each including a 2-liquid region.

487 **A Contribution to the Study of Alloy Solidification** — **A. Kohn and J. Philibert**

Mem. Sci. Rev. Met., April, 1960, 57(4), 291–312

(In French.) Deals mainly with light alloys but also covers investigation of solidification properties of tin-lead alloys.

488 **Observations of Macromosaic Substructures in Lead** — **R. F. Sekerka et al**

Canadian Journal of Physics, Vol. 38, No. 6, p. 883, June, 1960

Describes the production and structure of single crystals of lead and lead-silver alloys.

MISCELLANEOUS

489 High-Temperature Static Seals from Metal Fibre Composites — **M. Sabanas**

Prod. Eng., May 30, 1960, 31(22), 57–61

Stainless steel or molybdenum fibres are woven into felts and impregnated with lead or other metals for use as seals above 540°C. Describes physical and mechanical properties compatibility of felt and impregnant, seal performance and methods of production.

490 Experience with Russian Liquid-Metal Pumps — **P. L. Kirrilov and others**

Eng. Digest, June, 1960, 21(6), 115–116, 114. Condensed translation from Atomnaya Energiya, July, 1959, 7(1), 11–17

Considers construction of pumps designed for use between 300 and 600°C.

OXIDES

491 The Structure of β-PbO_2 — **S. S. Tolkachev**

Vestnik Leningradskogo Universiteta, Ser. Fiz. i Khim., 1, 1958, 4, pp. 152–153

(In Russian.) Single crystal X-ray studies have been used to determine the oxygen parameter. The structure is said to be predominantly ionic and consists of a lead atom surrounded by a regular octahedron of oxygen atoms.

PHYSICAL PROPERTIES

492 The Freezing Points of High Purity Metals as Precision Temperature Standards. VI.—Thermal Analyses on Five Samples of Lead with Purities greater than 99.999+% — **E. H. McLaren and E. G. Murdock**

Canad. J. Physics, May, 1960, 38(5), 577–587

Describes investigations of five samples of lead, including zone-refined metal. Impurity contents less than 4ppm. Resistance thermometry is shown to be capable of discriminating between samples of nominal purity 99.9999%.

REFINING

493 **Distribution of Silver between Liquid Lead and Zinc** — **D. T. Peterson and K. Kontrimas**

J. Phys. Chem., March, 1960, 64(3), 362–364

Measurements at various temperatures show that silver concentration, within the range studied, has no effect on the distribution coefficient.

494 **The Study of Pelletisation of Lead Concentrates** — **A. Lupu and L. Grigoriu**

Rev. Roumaine Met., 1960, 5(1), 119–131. Previously published in Studii si Cercetari de Metalurgie, Acad., R.P.R., 1959, 4, 3

Experiments carried out on the pelletisation of lead-pyrite concentrate (containing 75.3% lead) with the object of facilitating subsequent handling operations. (In English.)

495 **Hydrometallurgical Treatment of Alkaline Lead Dezincing Melts** — **V. S. Lovchikov and B. M. Lipshits**

Tsvetnye Metally (English Edition), Vol. 1, p. 113, May, 1960

Notes on the Harris process.

SCRAP

496 **Possibilities of Separating Alloyed and Coated Heavy Metals with Mercury** — **H. Borchers and K. Stoffels**

Erzmetall, April, 1960, 13(4), 165–169

(In German.) This work, which is a development of a method under consideration in Germany since 1939, covers antimonial lead and other alloys. None of the processes yet appears to offer promise of commercial exploitation.

SMELTING

497 **Shaft Furnace Lead Smelting and Possibilities for its Improvement** — **F. M. Loskutov**

Tsvetnye Metally (English Edition), Vol. 1, No. 2, p. 49, Feb., 1960

Articles published in English and Russian are discussed.

SOLDERS

498 **Solderability Tester Pinpoints Best Soldering Conditions** — **N. V. Philip Gloeilampen Fabrieken, Eindhoven, Holland**

Prod. Eng., April 25, 1960, 31(17), 44–45

Standard globule of molten solder is held in a hollow in a chromium-plated steel block. A flux-coated wire of the metal under test is introduced and solderability is measured by the time taken for the solder to flow around the wire.

STATISTICS

499 **(1) International Lead and Zinc Study Group** **(1) C. W. Nichols**
(2) Recent Developments in World Lead and Zinc Markets **(2) R. Hendricks**

Preprints, Joint Session of American Zinc Institute and Lead Industries Association, St. Louis, Missouri, April 7, 1960, 16pp., 19pp.

(1) Describes the history and activities of the Group, its purpose and organization. At present there are 25 member countries. (2) Covers world lead and zinc consumption and the effect on consumption, and of stockpiling. Also details research programmes.

PART 2 · PATENTS

BATTERIES

500 Sheaths for Active Material — **Accumulatoren-Fabrik A.G.**

British Patent 840,378

The plate consists of a number of vertical rods connected at the top, each rod being surrounded by active material sheathed by a tube of glass fibres. Method of manufacturing indicated.

501 Battery Additive — **H. Johnston**

South African Patent 59/3445

This battery additive fluid is an aqueous solution of aluminium sulphate with a small quantity of cadmium and magnesium sulphates, and a much smaller amount of sodium sulphate.

502 Electrolyte — **Electrical Storage Battery Co.**

South African Patent 60/434

This is essentially a dilute solution of sulphuric acid, with the addition of an aromatic aldehyde (or an oxidation or reduction product thereof) in the order of 1 to 10 g.p.l.

503 Prevention of Self-discharge — **Robert Bosch, G.m.b.H.**

British Patent 837,969

A synthetic resin, preferably based on phenol or cresol, is mixed with the paste to prevent the growth of antimony particles on the negative plates. A method of removing the antimony-rich surface layer by etching with sulphuric acid of 1.75 s.g. is described.

504 Compression Assembly — **Union Carbide Corporation**

Indian Patent 67,179

The battery assembly is maintained under constant transverse compression by means of side plates which exert spring-like action.

505 Pasting Machine — **Electric Storage Battery Co.**

British Patent 818,838

It is claimed that this pasting machine can deliver an accurately controlled amount of lead paste to the grids and fill the interstices to a pre-determined thickness. It can be adjusted quite simply to take grids of different sizes, and can be cleaned easily.

CABLES

506 Soldering Joints — **W. T. Glover & Co. Ltd.**

British Patent 835,742

First, the joint between the lead cable sheath and the gland is made in the usual way with an antimonial lead/tin plumber's solder. After it has cooled it is enclosed in a second wipe of a metal, the liquidus temperature of which is lower than or equal to the solidus of the solder originally employed. In this way, the first wipe is not melted or disturbed. A suggested solder for the second wipe is 50% lead, 35% tin, 15% cadmium, the liquidus temperature of which is 185°C, thereby ensuring that the whole of its plastic range is below that of the first solder, whose solidus temperature is also 185°C.

COMPOUNDS

507 Lead Tetraethyl — **National Aluminate Corporation**

British Patent 839,172

Lead tetraethyl may be made by electrolysing a solution of ethyl magnesium bromide (dissolved in a non-aqueous solvent such as diethylether) using a lead anode. Other Grignard reagents may be used to give analogous products.

508 Complex Organic Salts — **Chem. Fabrik Hoesch**

British Patent 841,328

The manufacture of a large number of complex lead salts of organic and inorganic acids is described.

ELECTRO-CHEMISTRY

509 Lead Dioxide — **Council of Scientific & Industrial Research**

Indian Patent 66,195

Method of electrolytically depositing lead dioxide from a solution of a soluble lead salt on to graphite or carbon electrodes.

ELECTRONICS

510 Lead Sulphide — **Eastman Kodak Co.**

British Patent 840,708

Lead sulphide photoconductive layers can be made having a conductivity which is reproducible, uniformly distributed and 10 to 100 times more sensitive than that achieved by previous methods. Thiourea is added to a strongly alkaline solution of a lead salt and the whole allowed to stand until the automatic seeding of solution is concluded, whereupon a preseeded plate is inserted and left for 10 to 100 minutes.

511 Lead Sulphide — **Eastman Kodak Co.**

British Patent 840,710

Improvement to above (840,708). A small amount of a copper salt previously added to the alkaline lead salt solution will appreciably improve the sensitivity of the lead sulphide deposit. The upper and lower limits for the copper are critical.

512 Seeding Glass Plates with Lead Sulphide — **Eastman Kodak Co.**

British Patent 840,709

To a dilute solution of a lead salt (circa .002 N) in the presence of a stabilizer such as polyvinyl alcohol (0.01% to 0.5%) a small excess of hydrogen sulphide solution is added. This is aged for at least 30 minutes and then a clean glass plate is inserted to receive the seeds.

513 Dielectric Ceramics — **Compagnie Generale de Telegraphic Sans Fil**

British Patent 840,292

Materials having a dielectric constant of several thousands at temperatures higher than 120°C can be made from lead or alkaline-earth titanates, stannates or zirconates.

514 Ferromagnetics — **Philips Electrical Industries**

British Patent 842,005

Ferromagnetic materials can be made by heating mixtures of metallic oxides at about 1150–1300°C. The principal ingredients are barium and iron oxides, with additions of bivalent metal oxides, but part of the barium oxide may be replaced by lime and/or litharge.

EXTRUSION

515 Extrusion Press — **Schloemann A.G.**

British Patent 838,309

In this press the die-holder is so mounted that it can be horizontally slid across the press axis in such a way that the level of the die-axis is not affected by changes in temperature of the carrier.

GLASS

516 Thermally Devitrifiable Glass — **Corning Glass Works**

German Patent 1,082,710

This glass, which can be thermally devitrified by heating for a short time at 450°C, contains 75% to 82% litharge.

LEADED STEELS

517 Adding Lead to Iron and Steel — **Gebr. Bohler & Co., A.G.**

German Patent 1,081,616

Lead is added during or after the casting of the steel into a special mould, which is cooled by gas or liquid. The liquid contents are stirred by a rotating electrical field, which necessitates the ingot mould being made of special non-magnetic steel.

METALLURGY

518 Hard Lead Alloys — **Elektrochemisches Kombinat Bitterfeld VEB**

German Patent 1,084,926

Lead alloys can be hardened by holding them at temps. up to 250°C for up to 2 hours immediately after casting. The process can also be used with low Mg. alloys (up to 0.6% Mg.).

OXIDES

519 Red Lead — **Kamani Pigment Works**

Indian Patent 66,176

This patent describes a plant which consists essentially of melting apparatus, oxidiser, cyclone, blower, roaster and bucket conveyor.

520 Granular Lead Oxide — **Accumulatoren Fabrik A.G.**

British Patent 841,884

Red lead, or litharge, may be obtained in a granular form by mixing the powdered oxide with 5–15% of a binding agent, keeping the mixture agitated until granules are formed, heating same, followed by cooling and grading. The binding agents may be sod. or pot. silicates, glycerol, sulphite liquor, molasses or a dispersion of P.V.C., polystyrene etc.

SOLDER

521 Solder Containing Copper — **G. Laubmeyer**

British Patent 838,514

Copper is added to solder to the extent of about 1% of the tin content, to prevent the solder taking up more of this metal from the copper soldering bits, so prolonging their life.